

REMARKS

This Amendment is submitted in response to the Office Action of June 15, 2006 (hereinafter “the Office Action”). Claims 1-20 remain pending.

All references to the claims, except as noted, will be made with reference to the Listing of Claims above beginning on page 4. All references to “the Office Action,” except as noted, will be referencing the most recent Office Action dated June 15, 2006. Line numbers in the Office Action, except as noted, will count every printed line, except the page header, but including section headings. If there is any confusion or questions regarding any aspect of this Amendment, the Examiner is invited to contact the undersigned.

Amendment

The specification is amended to explicitly note that the magnetic orientation of the MTJ devices are perpendicular to both the bitlines and the wordlines, as shown in, e.g., Figure 2. Since Figure 2 clearly shows that the magnetic orientation is perpendicular to the bitlines and the wordlines, this change does not introduce new matter.

The specification is further amended to correct a minor typographical error noted in the first line of page 11, wherein the letter “m” is replaced with the Greek “ μ ”.

In addition, the paragraph beginning at page 12, line 14 was amended to define each of the variables in equation 2 on page 12 of the application as filed. The variable definitions are either presented in the application as filed in Figure 10, or are standard definitions for the variables. For instance, the variable I is commonly used to represent current, and the variable H is commonly used to represent magnetic field strength. Therefore, this amendment does not add any new matter.

Claims 1 and 15 are amended to further provide that the perpendicular magnetic orientation is perpendicular to the word line and the bit line. In addition, claims 15 and 17 have been amended for better consistency and avoid antecedent basis issues, and claims 5 and 18 have been amended to replace “programmed” with “programmable” which clarifies that the claims are directed to a device constructed so as to be programmable as described, and not to a product by process, the product being the programmed memory device.

In addition, replacement drawing sheets for Figures 4A, 4B, and 5 are submitted to correct an error relating to element 100'. This corrects an inadvertent error created when a drawing originally prepared by the inventor was imported from Microsoft Powerpoint into Microsoft Visio, wherein the ellipse, which previously highlighted the electronic device, was caused to obscure it. No new matter is entered by this change since the element 100' is adequately described in the specification as filed, e.g., at page 8 line 20 to page 9, line 21.

No new matter is introduced by this Amendment.



Allowable Subject Matter

Applicant notes with appreciation that the Office Action does not reject claims 5-14 and 18-20 except on the basis of a 35 U.S.C. § 112 ¶2 rejection. It is therefore presumed that these claims would be allowed if the 35 U.S.C. § 112 ¶2 rejection is overcome.

Objection to the Drawings

The Drawings are under objection under 37 C.F.R. § 1.83(a) for failing to show every feature of the invention specified in the claims. The Office Action mentions several features that are allegedly not present in the drawings. Applicant respectfully disagrees and submits that each claim feature is in fact sufficiently presented in the drawings for proper understanding of the invention.

Structures in claims 5-7 and 18-20

Specifically, the Office Action suggests that the features recited in claims 5-7 and 18-20 are not adequately shown. Applicant respectfully disagrees. Claim 5 is directed to an MRAM cell that is programmable by driving current through the second bitline and third bitline, and the second wordline and the third wordline. Claim 6 depends from claim 5 and further identifies that the current driven through the second bitline is in an opposite direction to the current driven through the third bitline. Claim 7 depends from claim 6 and further defines that the current driven through the second wordline is in an opposite direction to the current driven through the third wordline. Figure 4A shows all of these features, including arrows identifying the direction of current flow. Figure 4B is similar, showing the programming of a logical "1" instead of a logical "0" which is shown in Figure 4A. However, the Office Action states that, "it should be noted that Figs. 4A-B and 5 of the present invention only show the plurality of MTJ devices  each connected to the respective bitline B and wordline W via u-metal  without any communication with a diode as recited in claims 3

and 17 (Office Action, page 2, lines 5-8). However, none of claims 5-7 and 18-20 depends from either of claims 3 or 17. Claim 5 depends from claim 4 which depends from claim 1 and claim 18 depends from claim 15. Therefore, the combination of features that the Examiner states are not shown are not present in the claims.

Structures in claims 8-11, 13, and 14.

In addition, the Office Action suggests that “the magnetic random access memory (MRAM) cell having a magnetic junction tunnel (MJT) device with perpendicular magnetic orientation the first magnetization as recited in claims 8 and 10, the second magnetization as recited in claims 9 and 11, the first-in plane component and the second-in plane component as recited in claim 13 and the first-in plane component cancels out the second-in plane component as recited in claim 14 (it should be noted that Figs. 4A-B and 5 of the present invention show the magnetic random access memory (MRAM) cell 100’ represented by the O ring symbol which is totally separated with the MTJ devices)” are not shown.

With regard to the claims mentioned, these claims are directed to methods, which do not encompass the structure set forth only in the preamble of the claim of an MRAM cell having an MJT device with a perpendicular magnetic orientation. To the extent that structure of the MRAM cell is claimed, the structure is more than adequately depicted in the drawings. With regard to the magnetic orientations, reference is made to the double-headed arrow 108 in Figures 1, 2, 3, and 6, and the reversed arrow direction in Figure 7 depending on whether the element holds a logical “1” or a logical “0”. The magnetization of free layer 108 is indicated by a double-headed arrow symbol, which clearly shows the two magnetizations possible for the cell. Figure 6 shows the cancellation of in-plane components of the magnetic fields generated by the currents in adjacent bitlines.

With regard to the O-ring symbol in Figures 4A, 4B, and 5, this error was corrected by this Amendment. Applicant appreciates that this error was pointed out in the outstanding Office Action, and believes the present amendment to the drawings corrects the oversight.

Applicant respectfully requests reconsideration of the Objections to the Drawings in light of Amendments made to the drawings as well as the discussion above. If any confusion remains as to the drawings, the Examiner is invited to contact the undersigned.

Objection to the Specification

The specification is under objection because certain variables in equation 2 were not defined (Office Action, page 3, lines 11-14). This Amendment includes changes to the paragraph beginning on line 14 of page 12 of the application as originally filed, the changes incorporating the requested variable definitions. Applicant therefore respectfully request reconsideration and withdrawal of this Objection.

Claim Rejections - 35 U.S.C. § 112 ¶2

Claims 5-14 and 18-20 stand rejected under 35 U.S.C. § 112, ¶2, because “they are not readable on the respective drawings of the present invention” (Office Action, page 3, lines 19-23). Specifically, the Office Action notes that Figures 4A, 4B, and 5 show the MRAM cell 100’ represented by an O-ring symbol which “is totally separated with the MTJ devices” (Office Action, page 3, line 23 to page 4, line 2). Applicant believes this rejection is obviated by changes made by this Amendment to Figures 4A, 4B, and 5 as described above. Accordingly, Applicant respectfully requests reconsideration and withdrawal of this rejection.

Claim Rejections – 35 U.S.C. § 102(b)

Claims 1-4 and 15-17 stand rejected under 35 U.S.C. § 102(b) for being anticipated by U.S. Patent 5,640,343 issued to Gallagher et al., hereinafter referred to as “Gallagher.” Applicant respectfully traverses because Gallagher does not show each and every feature set forth in the claims.

Specifically, Applicant notes that, as amended, claims 1 and 15 provide that the perpendicular magnetic orientation is perpendicular to both the bit line and the word line. As acknowledged in the Office Action, Gallagher teaches a magnetic orientation that is parallel to the word lines (Office Action, page 4, lines 18-19). Since claims 1 and 15 now clearly define over the prior art of record, Applicant respectfully submits that they are allowable over Gallagher and reconsideration is therefore requested. With regard to depending claims 2-4, 16, and 17, Applicant submits that these claims are allowable for at least the same reasons as independent claims 1 and 15, from which they depend.

Applicant respectfully submits that the present Application is now in condition for allowance. A Notice of Allowance is therefore respectfully requested.

If the Examiner has any questions concerning the present amendment, the Examiner is kindly requested to contact the undersigned at (408) 774-6933. If any other fees are due in

connection with filing this amendment, the Commissioner is also authorized to charge Deposit Account No. 50-0805 (Order No. MXICP017). A duplicate copy of the transmittal is enclosed for this purpose.

Respectfully submitted,
MARTINE PENILLA & GENCARELLA, LLP

A handwritten signature in black ink, appearing to read 'Leonard Heyman', with a long, sweeping horizontal line extending to the right.

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IN THE DRAWINGS

Amendment to the Drawings:

Please replace the three sheets of drawings containing Figures 4A, 4B, and 5 with the three attached replacement sheets of drawings. The only substantive change to the drawings is where element 100' – previously represented by an empty ellipse, now shows an electronic device encircled by the ellipse. This corrects an inadvertent error created when a drawing was imported from Microsoft Powerpoint into Microsoft Visio, wherein the ellipse, which previously highlighted the electronic device, was caused to obscure it. No new matter is entered by this change since the element 100' is adequately described in the specification as filed, e.g., at page 8, line 20 to page 9, line 21.